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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/826,127	04/16/2004	Akio Furukawa	09792486-0145	9867

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EXAMINER

MILLER, BRIAN E

ART UNIT PAPER NUMBER

2627

DATE MAILED: 12/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/826,127

Applicant(s)

FURUKAWA ET AL.

Examiner

Brian E. Miller

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 November 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5, 13 and 14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 13 and 14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

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This application is a DIV of 10/218,247 and claims 1-5, 13-14 are now pending.

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/14/06 has been entered.

***Specification***

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

3. The disclosure is objected to because of the following informalities: (a) "The Brief Description of the Drawings", should be amended in a neat, orderly fashion, e.g., in a listed manner. Appropriate correction is required.

4. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-5, 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al (US 6,262,869) in view of Fontana Jr. et al (US 5,729,410). Lin et al discloses, as shown in at least FIG. 16, a magnetic head 300 using magnetoresistive effect including: a magnetic sensing portion formed of a magnetoresistive effect element, wherein: the magnetic sensing portion includes a lamination layer structure portion in which at least a free layer, i.e. sense layer, 304 made of a soft magnetic material of which the magnetization is rotated in response to an external magnetic field, a fixed layer, i.e., reference layer, 306 made of a ferromagnetic material, an antiferromagnetic layer (pinning layer 308) for fixing the magnetization of the fixed layer and a spacer layer 302 interposed between the free layer 304 and the fixed layer 306 are laminated with each other (see paragraph (24)); the lamination layer structure portion further includes a magnetic flux introducing layer (keeper layer 320) of which the tip end is opposed to a surface which is brought in contact with or opposed to a magnetic recording medium 34 (see FIG. 2); the lamination layer structure portion has at its lamination layer direction opposing side surfaces (344, 346) formed of one flat surface or continuous one curved surface over at least the free layer, the spacer layer and the fixed layer, as shown in the figure (also see FIG. 19I); a hard magnetic layer 348, 350, having high resistance or low resistance for maintaining a magnetic

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stability of the free layer is disposed in direct contact with the opposing surfaces (see paragraph 26); and an external magnetic field is applied to the direction extended along the plane direction of the lamination layer structure portion and which is extended substantially along the opposing side surfaces (as shown in FIG. 11 for example, and col. 12, lines 23+); (as per claim 3) wherein the spacer layer 302 is formed of a nonmagnetic conductive layer (see col. 10, lines 19-20); (as per claim 5) wherein the hard magnetic layer 348/350 and the free layer 304 are disposed in such a manner that a central portion in the thickness direction of the hard magnetic layer “substantially agrees” with a central portion in the thickness direction of the free layer, in so far as this has been defined in the claim.

Lin et al remains silent as to the sense current flowing in the thickness direction, i.e., CPP instead of CIP, of the lamination layer structure. Fontana, however, discloses a GMR device, having a tunnel junction type sensor, wherein the current moves from top to bottom of the sensor, i.e., perpendicular to plane, and has leads on the top and bottom to facilitate this. The MTJ layer 120 also allows for this current path (see FIG. 5). From this teaching, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have aligned the lead layers in the vertical direction and substituted the spacer layer for the MJT layer, to the structure of Lin et al, as was well known in the art.

The motivation would have been: lacking any unobvious or unexpected results, modifying the sensor as above allows control of the resistance and magnetization of the magnetic field to provide a stable, linear output for the magnetic head (col. 2, lines 40-44 and col. 6, lines 30-53).

With respect to claim 2, Lin et al teaches substantially all of the limitations of claim 2 except for a second of each a fixed, free, and fixing layer added to the lamination. Official

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Notice is taken, however, that such GMR sensors, commonly known as dual spin valve sensors, include two each of the aforementioned layers and are notoriously old and well known in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have provided the GMR sensor of Lin et al with a second free, pinned and pinning layer, as known in the art in order to provide a substantially larger GMR response, as was conventionally known in the art.

The limitations of claim 4, i.e., the spacer layer being a “tunnel barrier layer”, flows from the modification as set forth above, and would have been readily apparent to a skilled artisan.

Claims 13 & 14, having similar limitations as set forth in claims 1 & 2, are rejected under the same grounds.

### ***Response to Arguments***

8. Applicant's arguments with respect to claims 1-5, 13-14 have been considered but are moot in view of the new ground(s) of rejection.

It is noted that the teachings of Lin et al in view of Fontana show a device having a sense current flow in the thickness direction of the lamination layer structure, as now required by the pending claims.

### ***Conclusion***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian E. Miller whose telephone number is (571) 272-7578. The examiner can normally be reached on M-TH 6:30am-4:00pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T. Nguyen can be reached on (571) 272-7579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>.

Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



**Brian E. Miller**  
**Primary Examiner**  
**Art Unit 2627**

BEM  
November 24, 2006